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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Ikuya Miyamoto

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STAAS & HALSEY LLP  
SUITE 700  
1201 NEW YORK AVENUE, N.W.  
WASHINGTON, DC 20005

EXAMINER

LEE, RIP A

ART UNIT

PAPER NUMBER

1796

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/517,828	<b>Applicant(s)</b> MIYAMOTO, IKUYA	
	<b>Examiner</b> RIP A. LEE	<b>Art Unit</b> 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 February 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4-6, 8, 10 and 11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-6, 8, 10 and 11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

This office action follows a response filed on February 29, 2008. Claim 1 was amended, and claims 7, 9, and 12 were amended. Claims 1, 2, 4-6, 8, 10 and 11 are pending.

#### ***Claim Rejections - 35 USC § 103***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2, 4-6, 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dontula *et al.* (U.S. 6,841,226) in view of Mehta *et al.* (U.S. 6,844,389) for the same reasons set forth in the previous office action dated December 3, 2007.

Dontula *et al.* teaches a composition comprising a polyethylene melt-blended with smectite clay intercalated with oxylated alcohol wax (ethoxylated alcohols); see col. 5, lines 54-62. The reference does not teach use of modified polyolefin. However, at the time the invention was made, use of compatibilizing agent for making polyolefin-clay nanocomposite materials was well-established art.

Mehta *et al.* teaches polyethylene-based nanocomposites wherein compatibilizing agent is also used to improve dispersion of filler. Where compatibilizing agent is not used, the composition suffers reduced melt strength. The compatibilizing agent of choice is a polymer of ethylene having from 0.1-8 wt % of ethylenically unsaturated carboxylic acid monomer copolymerized therewith or grafted thereto (claim 1). The inventors teach maleic acid as the unsaturated carboxylic acid monomer (col. 6, line 27). It would have been obvious to one having ordinary skill in the art to use polyethylene grafted with about 0.1-8 wt % of maleic acid, taught in Mehta *et al.* in the composition of Dontula *et al.* in order to attain homogeneous dispersion of the layered silicate filler, and since this practice is well-known in the art, one having ordinary skill in the art would have expected such a combination to work with a reasonable expectation of success. With respect to the amount of compatibilizing resin, Mehta *et al.* teaches a working

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amount of 0.25-12 wt % of compatibilizing agent is acceptable for preparing polyethylene-clay nanocomposites. Thus, one of ordinary skill in the art would have found it obvious to use this amount since it is shown to work.

Mehta *et al.* does not disclose the spectral properties of the maleic acid grafted polyethylene. The instant claims indicate that the hydrogen bonding modification degree,  $P_{CH}$ , defined as  $I_{CO2}/(I_{CO1} + I_{CO2})$ , is 0.80 or more. Since the maleic acid grafted polyethylene is substantially free of carboxylic anhydride carbonyl groups, the term  $I_{CO1}$  in denominator vanishes, such that the value of  $P_{CH}$  would be unity. The claims also recite the relationship that  $P_{C1}$ , defined as  $(I_{CO1} + I_{CO2})/I_{CH2}$ , lie in the range of 0.03 to 0.100. Although the intensity of the IR band is not directly related to molar quantities, the equation indicates that there must be a minor amount of grafted maleic group such that the intensity of band due to carbonyl groups is 10 % of the intensity due to CH stretching. It would appear that compatibilizer of Mehta *et al.*, which contains up to 8 wt % of maleic acid, exhibits such a relationship. Since the PTO can not conduct experiments, the burden of proof is shifted to the Applicants to establish an unobviousness difference. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

### ***Response to Arguments***

3. The rejection of claims over Dontula *et al.* (U.S. 6,841,226) in view of Hasegawa *et al.* (*J. Appl. Polym. Sci.*, 1998), and further in view of extrinsic evidence furnished in Anno *et al.* (U.S. 6,475,690), set forth in the previous office action has been withdrawn. Hasegawa *et al.* discloses maleic anhydride modified polyolefin compatibilizer rather than maleic acid modified polyolefin. Upon further consideration, the combination of references do not suggest definitively that the acid value of polymer of Hasegawa *et al.* reflects free hydroxyl groups such that the relationship  $I_{CO2}/(I_{CO1} + I_{CO2})$  is 0.80 or more prior to measurement of acid value.

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The rejection of claims over Mehta *et al.* (U.S. 6,844,389) has been overcome by amendment. The reference does not disclose layered silicate that comprises non-ionic surfactant in the interlayer spaces of said layered silicate.

The rejection of claims over Kurokawa *et al.* (*J. Mat. Sci. Letts.*, 1996) has been overcome by amendment. The reference does not disclose layered silicate that comprises non-ionic surfactant in the interlayer spaces of said layered silicate.

Applicant traverses the rejection of claims over Dontula *et al.* (U.S. 6,841,226) in view of Mehta *et al.* (U.S. 6,844,389). Applicant submits that Mehta *et al.* teaches use of maleic anhydride as a preferred monomer for [making] a compatibilizing agent, and thus, Mehta *et al.* would teach away from use of maleic acid modified polyolefin as compatibilizing agent. This line of reasoning is not found persuasive because a reference must be considered in its entirety. The disclosure of a reference is not limited to preferred embodiments or specific working examples therein. Rather, a reference is relevant for all it contains. *In re Fracalossi*, 681 F.2d 792, 794, 215 USPQ 569, 570 (CCPA 1982). *In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976). *In re Heck*, 669 F.2d 1331, 1333, 216 USPQ 1038, 1039 (Fed. Cir. 1983).

Attention is drawn to claim 1 of Mehta *et al.* which clearly claims use of polymers of ethylene having “ethylenically unsaturated carboxylic acid grafted [thereto].” Turning to the specification, the reference clearly teaches that maleic acid is a one of a limited set of ethylenically unsaturated carboxylic acid (col. 6, line 27). Use of maleic acid is especially evident in face of teaching that maleic anhydride is a preferred derivative of unsaturated carboxylic acid.

A reference may be said to “teach away” when a person of ordinary skill in the art, upon reading the reference, would be discouraged from following the path set out in the reference. *Tec Air, Inc. v. Denso Manufacturing Michigan*, 192 F.3d 1353, 1360, 52 USPQ 2d 129 (Fed. Cir. 1999). As elucidated above, one of ordinary skill in the art would not be discouraged from using maleic acid as grafting monomer because the claimed invention of Mehta *et al.* actually

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encourages use of such material. Therefore, it is maintained that one having ordinary skill in the art would have found it obvious to employ polyethylene grafted with about 0.1-8 wt % of maleic acid, taught in Mehta *et al.*, as compatibilizing resin in the composition of Dontula *et al.*

Finally, it was established that polyolefin modified with 0.1-8 wt % of maleic acid exhibits the claimed property of  $I_{CO2}/(I_{CO1} + I_{CO2})$  being 0.80 or more, and adequate reasoning was presented to lend one of ordinary skill in the art to believe that such a modified polyolefin exhibits a value of  $Pc1$ , defined as  $(I_{CO1} + I_{CO2})/I_{CH2}$ , within the claimed range of 0.03 to 0.100. The burden of proof was shifted to the Applicant to establish any unobviousness differences. To date, Applicant has not met this burden of proof.

In light of these considerations, the rejection has been maintained.

### ***Conclusion***

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu S. Jagannathan, can be reached at (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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June 13, 2008

/VASUDEVAN S. JAGANNATHAN/

Supervisory Patent Examiner, Art Unit 1796